

Land Surface Modeling Studies in Support of AQUA AMSR-E Validation

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Project Goal:

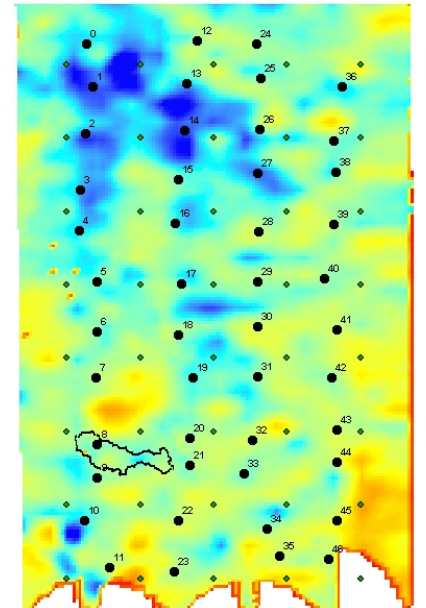
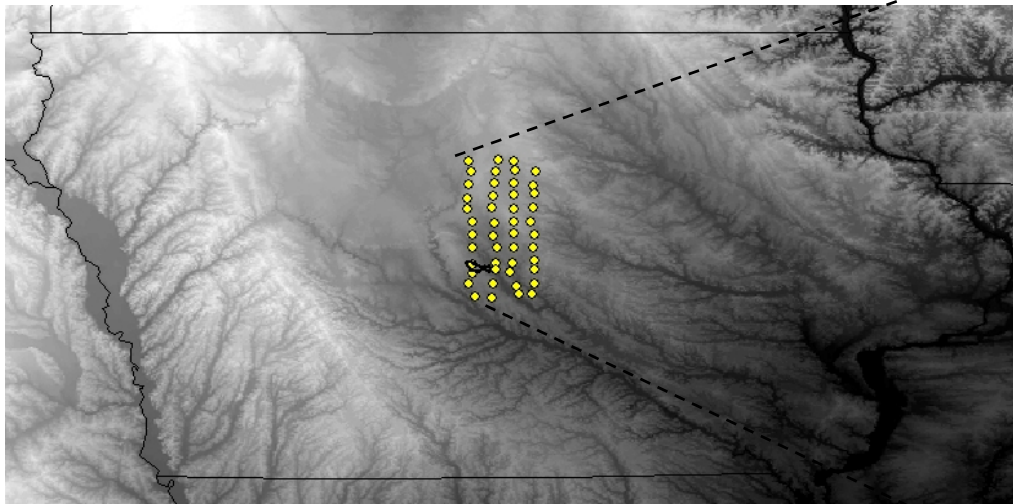
To provide modeling support to the AMSR-E validation activities through a combination of soil moistures retrievals (using the Land Surface Microwave Emission Model (LSMEM) of Gao et al., 2004) and process-based hydrological modeling.

Recent Activities:

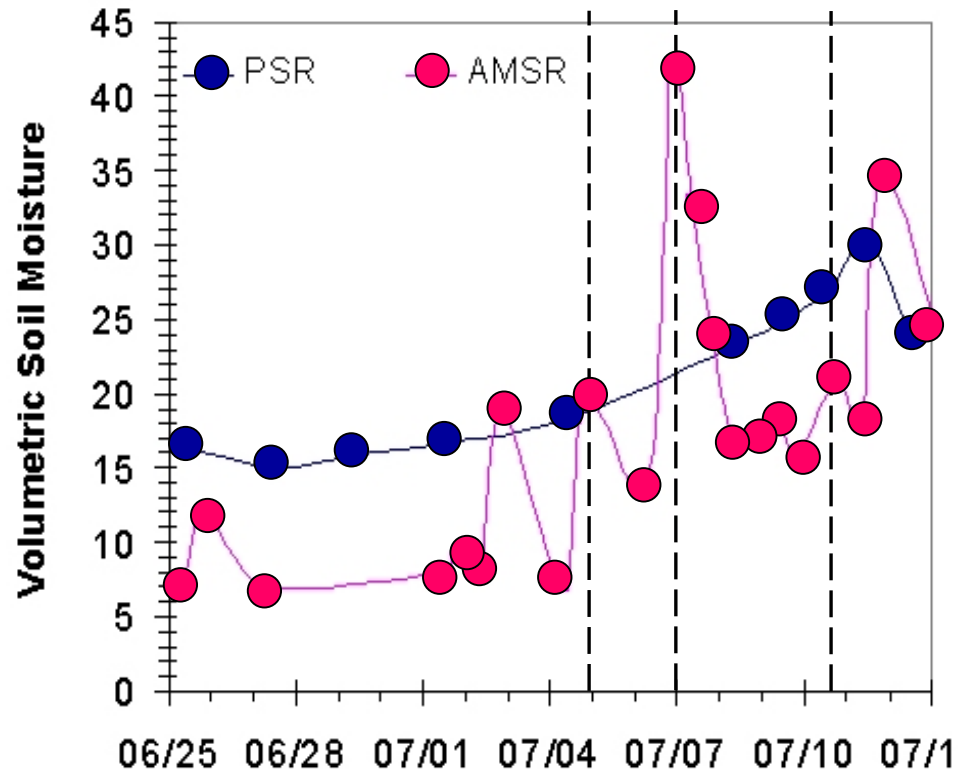
1. SMEX02 validation (Iowa, 2002)
2. Comparisons between AMSR-E and TMI over the SGP

SMEX02: *AMSR-E Soil Moisture Comparison with the Polarimetric Scanning Radiometer (PSR)*

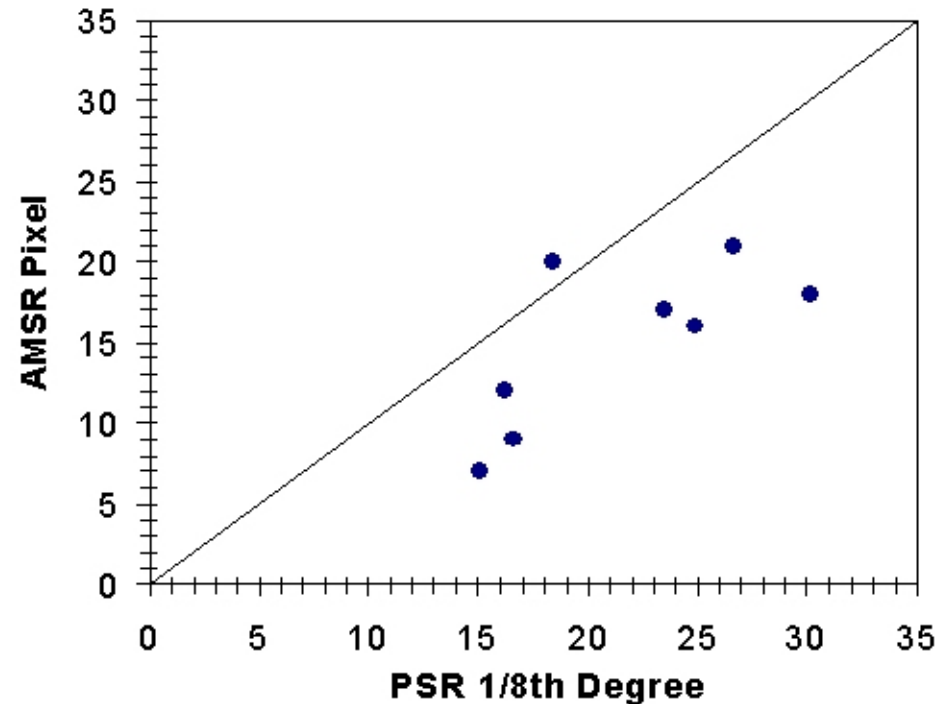
- PSR was flown on the P-3, and provides an excellent intermediate validation scale between ground measurements and AMSR-E scales.
- Data is supplied at the nominal resolution of 800m, and covered an area of approximately 70x100 km, for 10 days.
- The soil moisture retrievals were done by USDA.



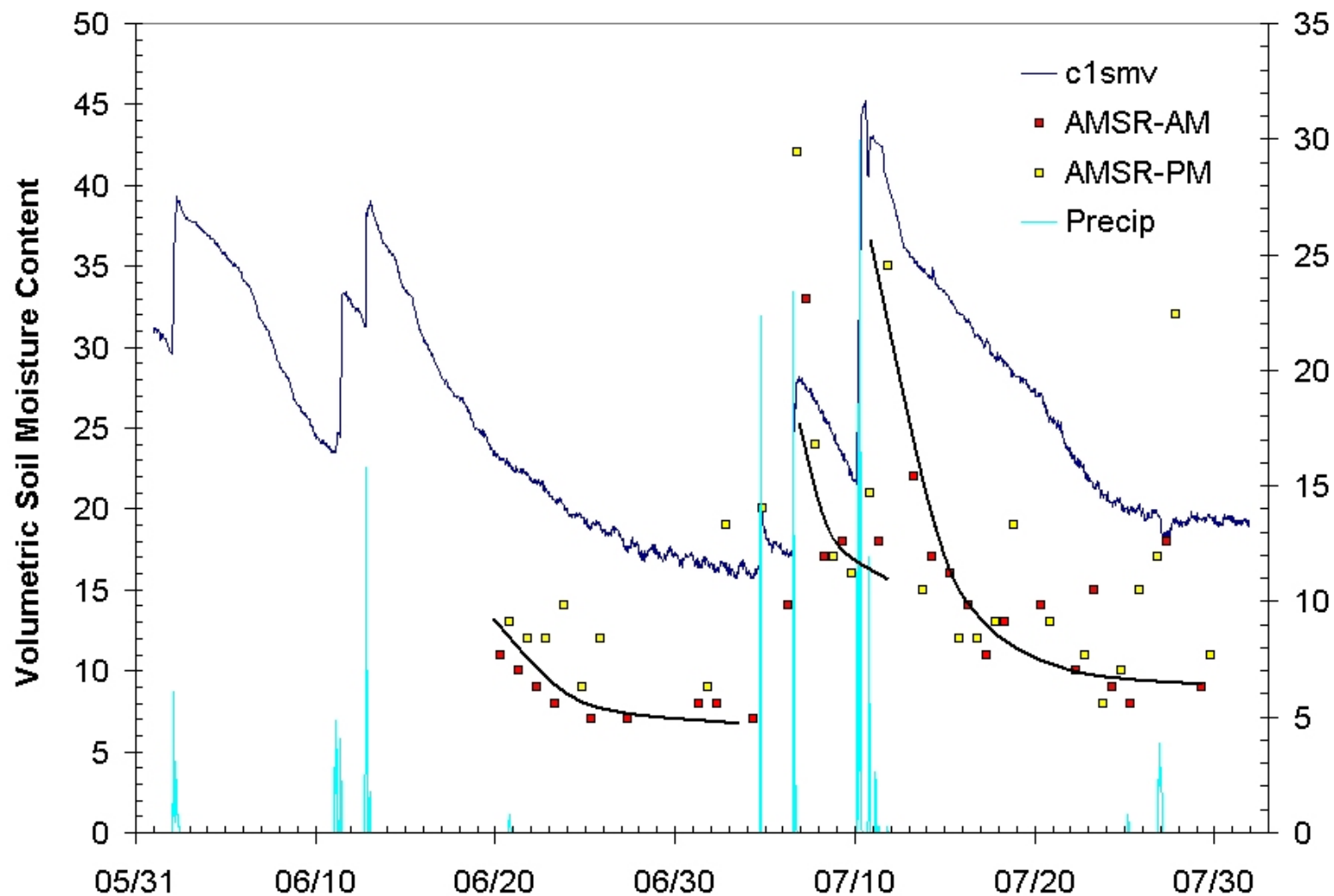
SMEX02: AMSR-E X-Band Soil Moisture Comparison with Polarimetric Scanning Radiometer (PSR) C-Band



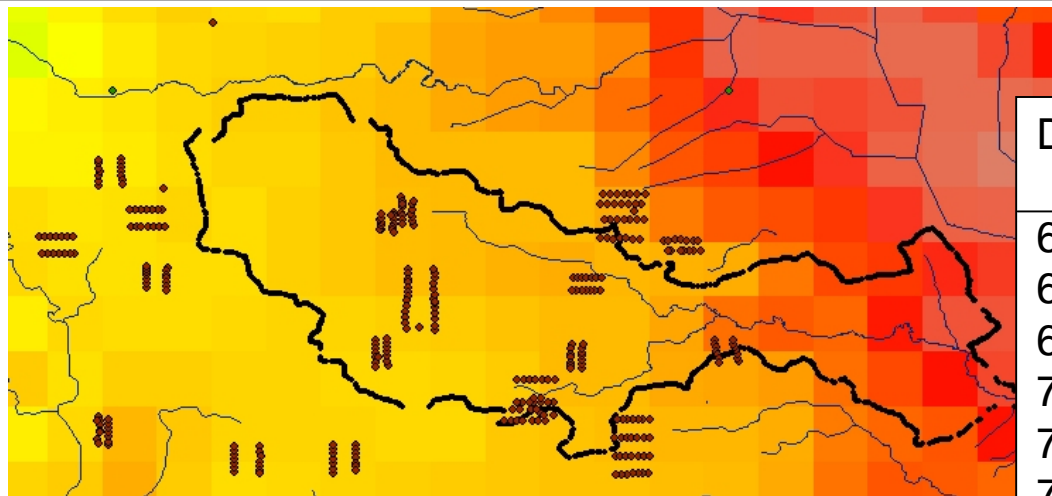
Date: June-July 2002



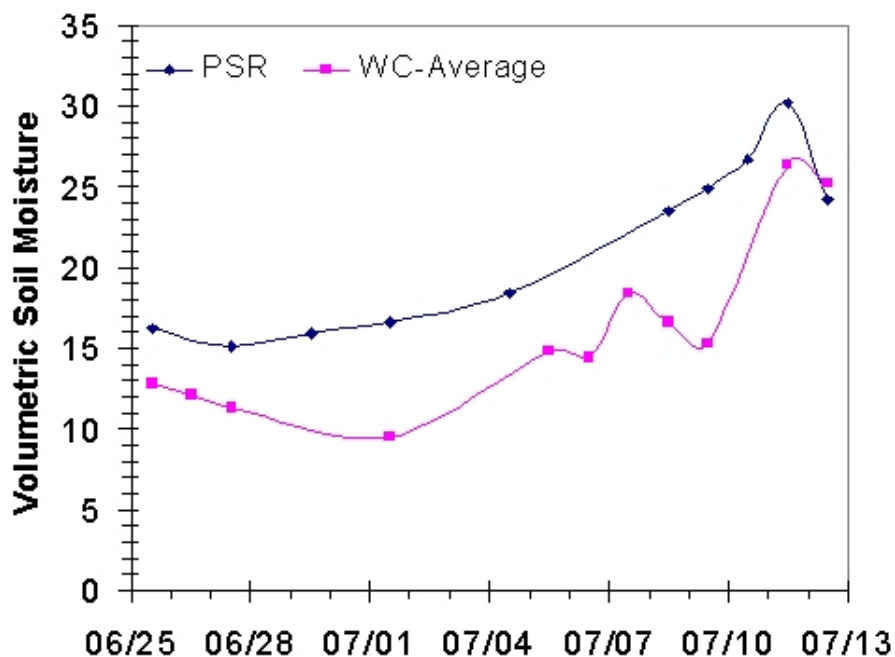
SMEX02: AMSR-E X-Band Soil Moisture Comparison with the ARS SCAN Soil Moisture Monitoring Site



SMEX02: AMSR-E X-Band Soil Moisture Comparison with the Theta Probe Field Data

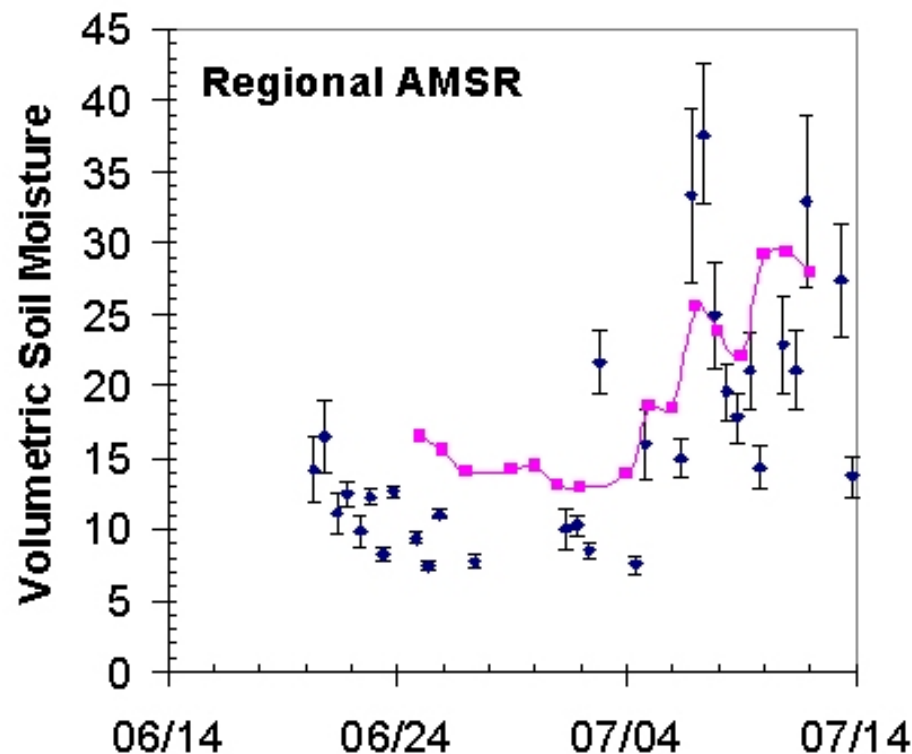
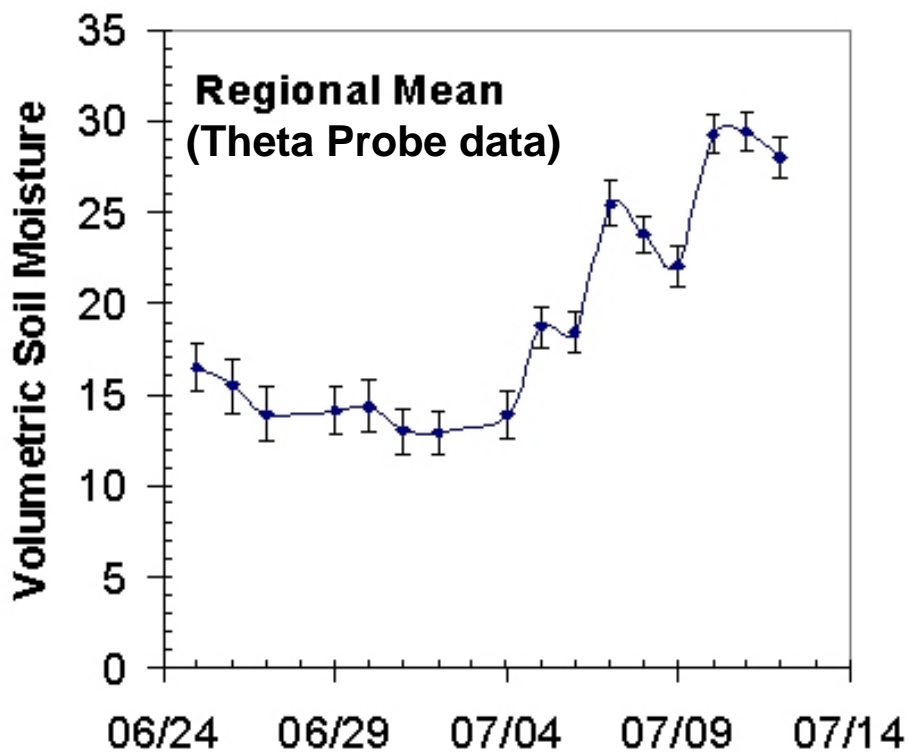


Date	Samples	Soil Moisture		AMSR*
		Avg	Std dev	
6-25	272	12.8	2.6	9.5
6-26	273	12.1	2.8	
6-27	273	11.3	2.3	7.0
7-1	103	9.5	1.6	8.5
7-5	271	14.8	2.4	
7-6	273	14.4	2.2	14.0
7-7	273	18.4	2.7	28.5
7-8	273	16.6	2.3	17.0
7-9	273	15.3	2.4	17.0
7-11	260	26.4	1.8	26.5
7-12	273	25.2	2.1	



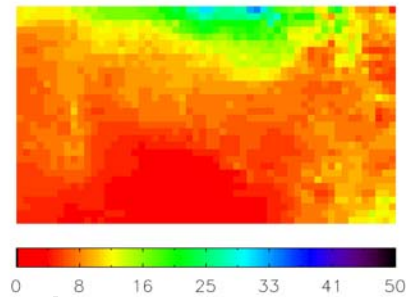
*AMSR-E values indicate the resampled pixel that encompasses the Walnut Creek catchment ~65% of the pixel

SMEX02: AMSR-E X-Band Soil Moisture Comparison with the Field Theta Probe Measurements

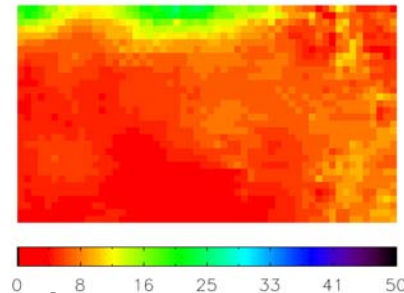


(Notice how AMSR-E has more realistic variability after rain events)

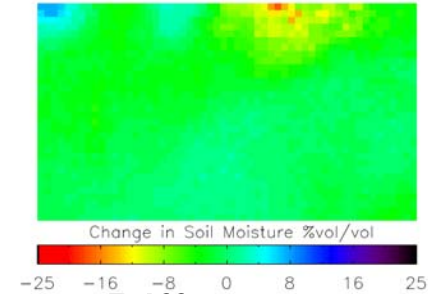
SMEX02: *AMSR-E X-Band Soil Moisture Differences Over Two Days*



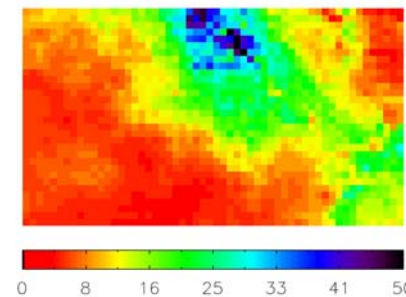
June 23, 2002



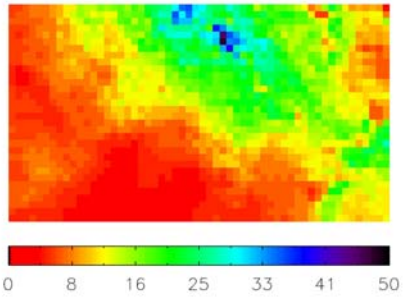
June 25, 2002



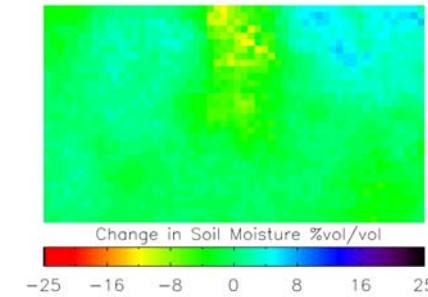
Difference



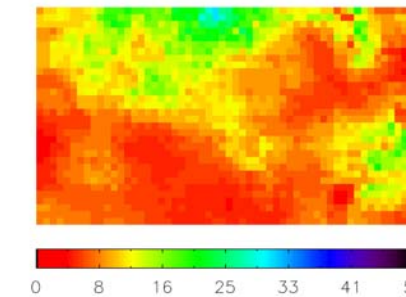
Aug 28, 2002



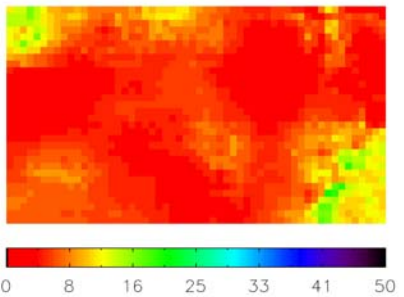
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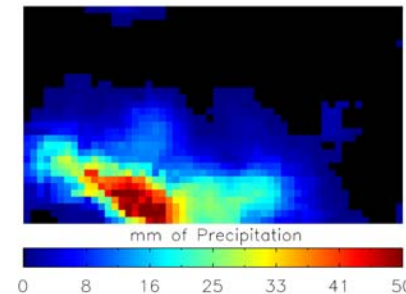
Difference



Aug 19, 2002



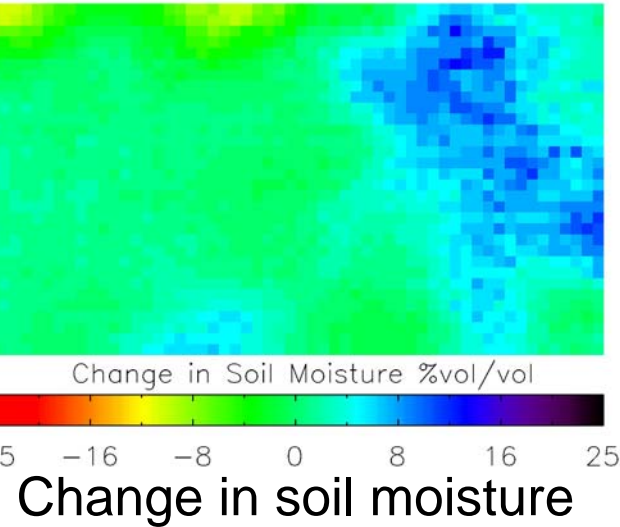
Aug 21, 2002



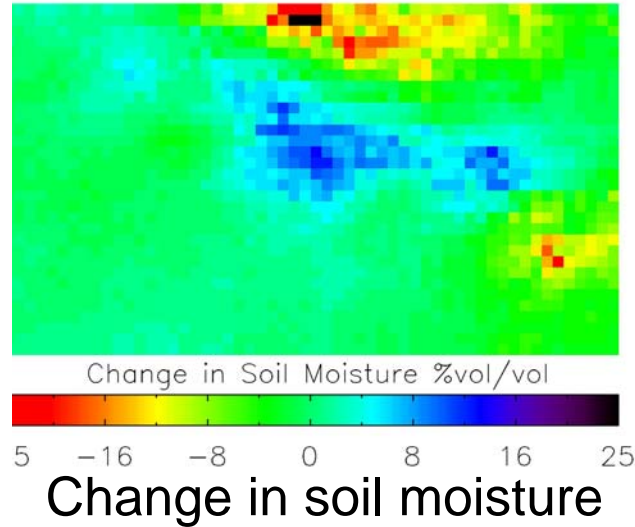
Precipitation

SMEX02: *AMSR-E X-Band Soil Moisture Differences Over Two Days with Rain*

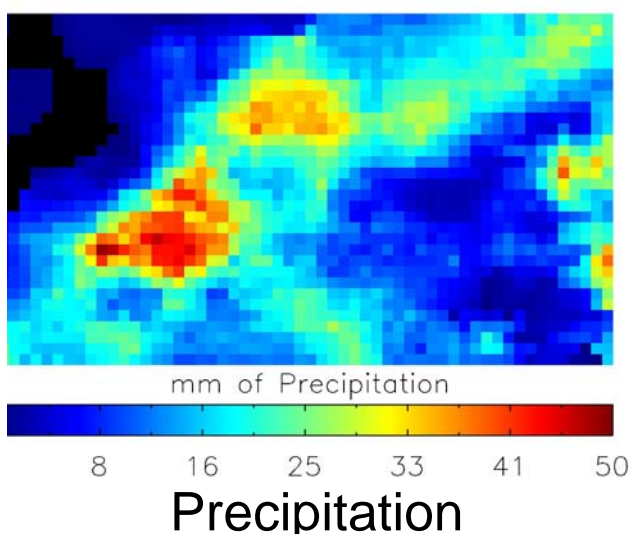
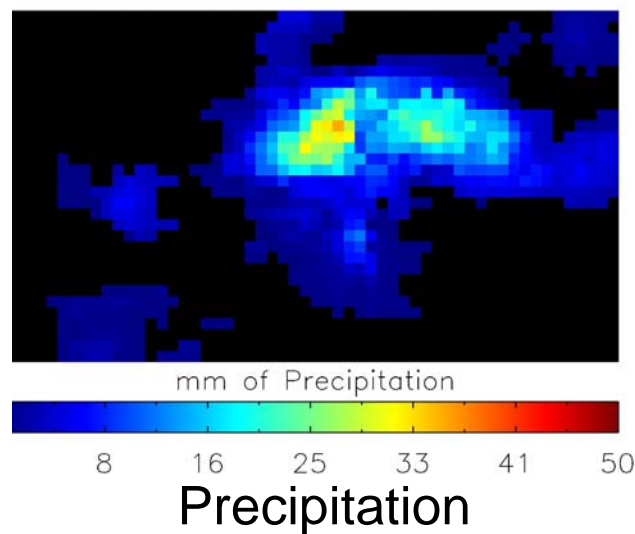
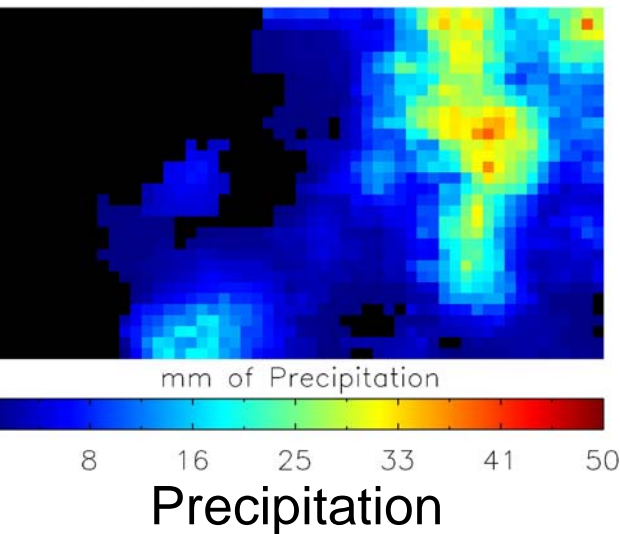
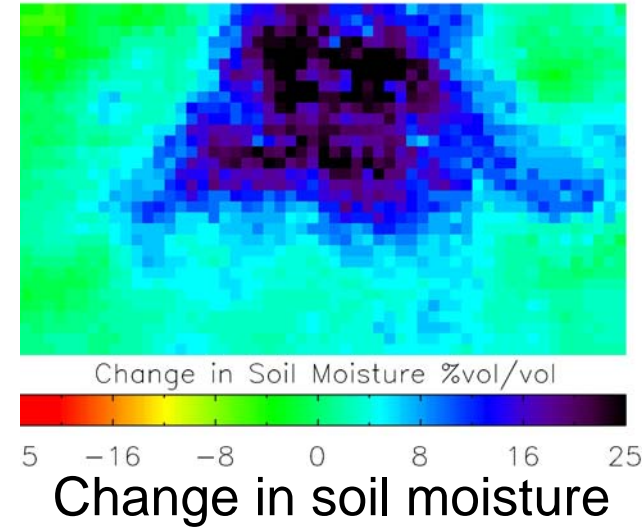
June 25-June 27



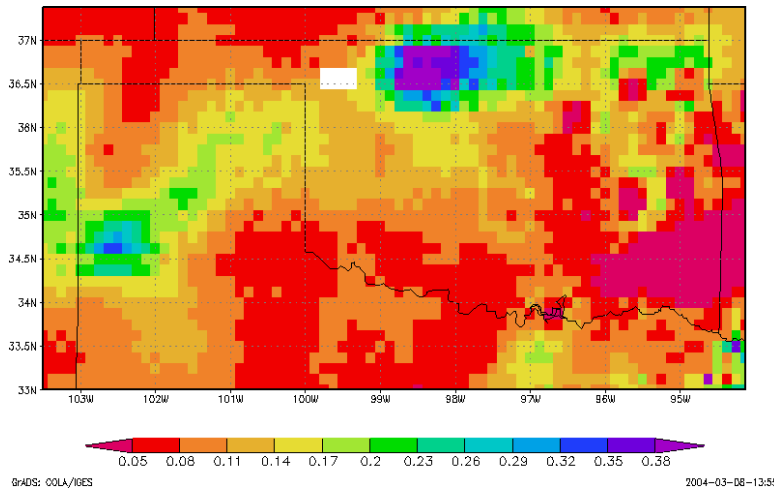
July 4-July 6



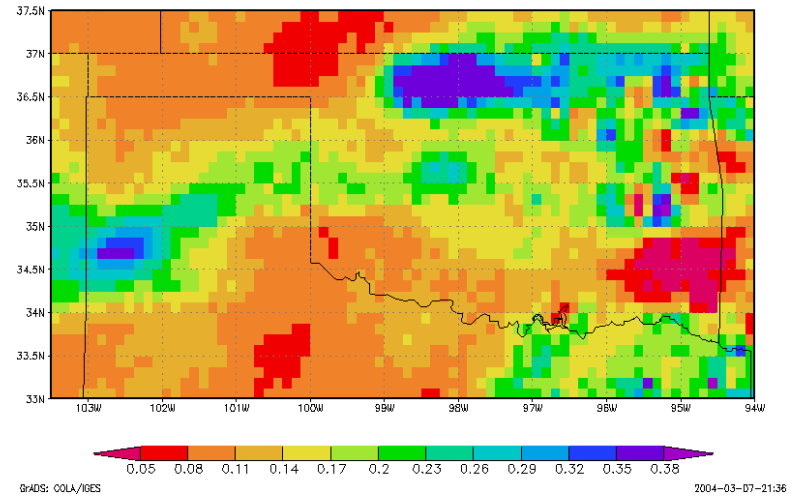
Aug 12-Aug 14



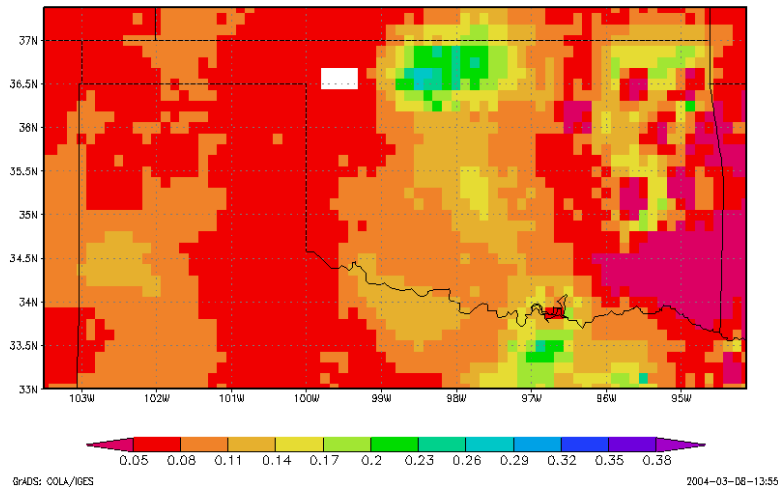
AMSR-E X-Band Soil Moisture Comparisons with TMI X-Band Soil Moisture



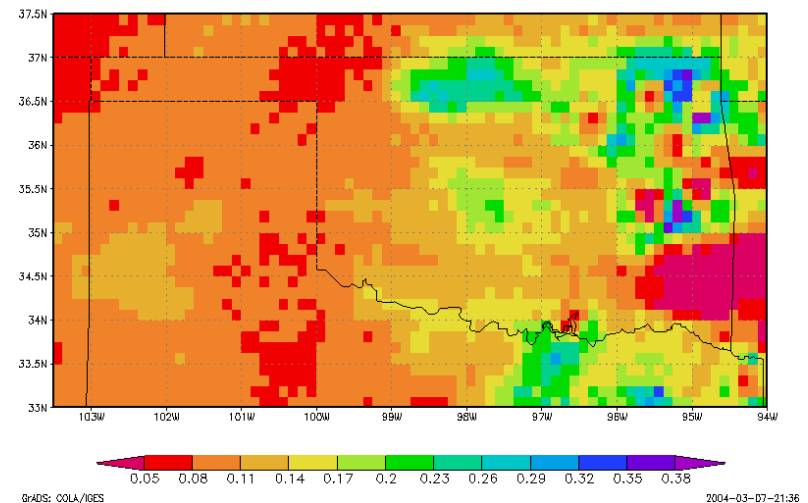
AMSR-E retrieved soil moisture July 23, 2002



TMI retrieved soil moisture July 23, 2002

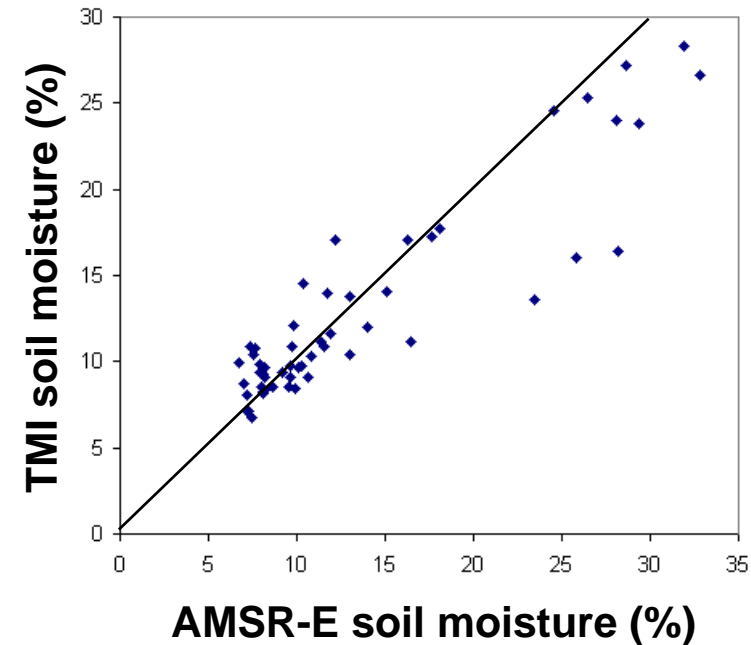
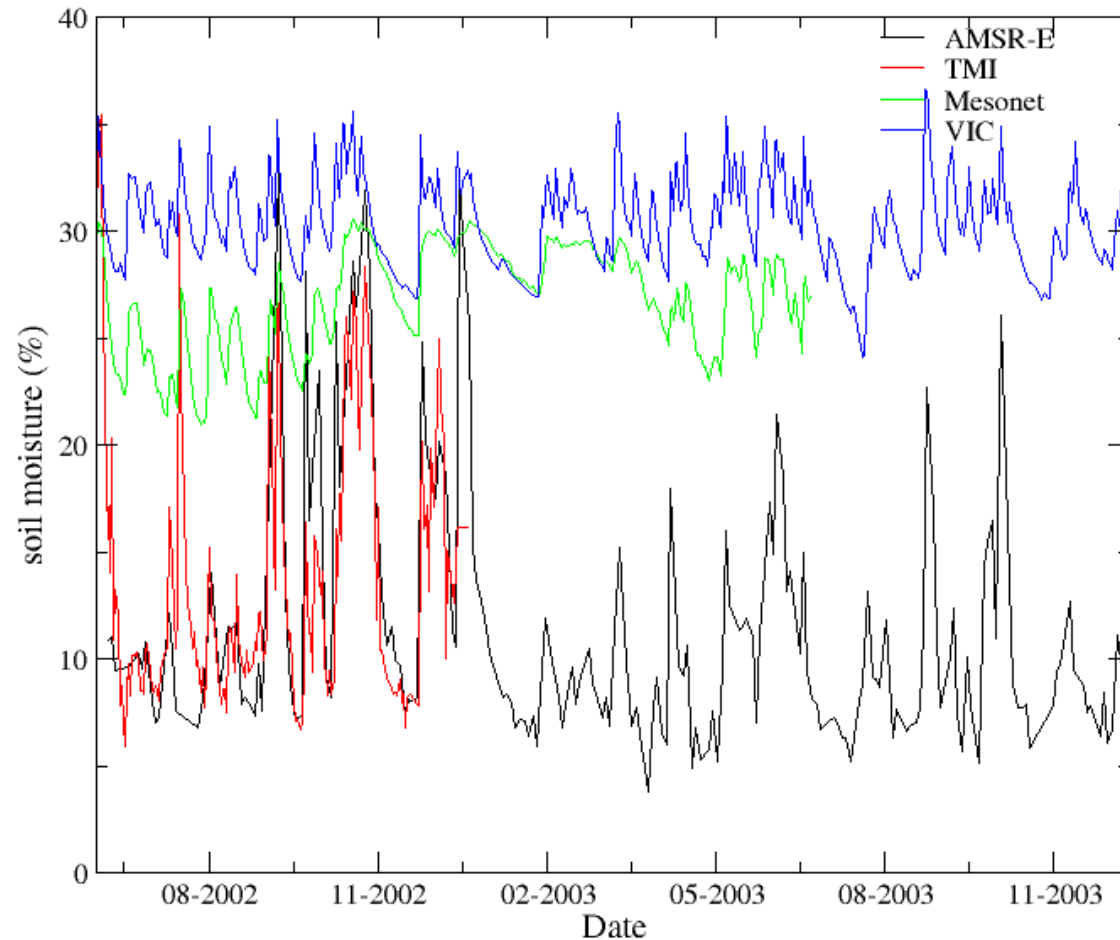


AMSR-E retrieved soil moisture July 25, 2002



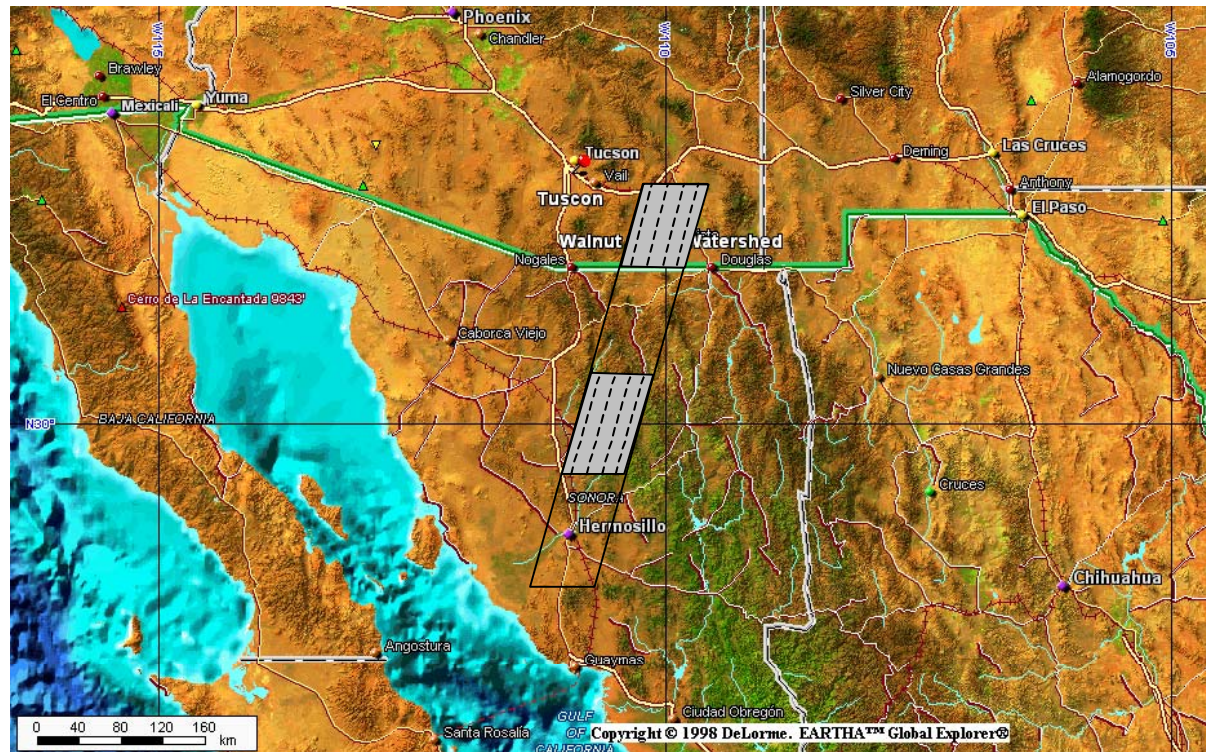
TMI retrieved soil moisture July 25, 2002

AMSR-E X-Band Soil Moisture Comparisons with TMI X-Band Soil Moisture



SMEX04: AMSR-E Soil Moisture Validation as part of the North American Monsoon Experiment (NAME)

- Field elements: in-situ soil moisture networks, aircraft mapping of soil moisture, intensive field sampling, and satellite products.
- Two regional study sites (~50 km by 75 km)
- NASA P-3 aircraft flying the Polarimetric Scanning Radiometer (PSR) with X and C band channels and the Two Dimensional Synthetic Aperture Radiometer (2DSTAR) with L band channels.



Satellite data:
Aqua AMSR-E,
Coriolis Windsat,
TRMM TMI, DMSP
SSM/I, Terra MODIS
and ASTER, and
Envisat ASAR. Used
for soil moisture and
vegetation studies.

Future Activities: AMSR-E Soil Moisture Validation in Australia

In conjunction with University of Melbourne.

2005:

Goulburn River catchment situated approximately 350km north-west of Sydney
26 soil moisture monitoring sites, 8 stream gauging stations and 5 climate stations

Further details at <http://www.civag.unimelb.edu.au/~jwalker/data/sasmas/>

